User Manual

SR500*i*....LAN+

No-Break™ DC UPS with Ethernet / SNMP comms. port
500W

(optional V/I meter shown)

Z367

Please refer to separate user manual for full SNMP instructions

Specifications are subject to change without notice. No liability accepted for errors or omissions.

Safety

The user is responsible for ensuring that input and output wiring segregation complies with local standards and that in the use of the equipment, access is confined to operators and service personnel. A low resistance earth connection is essential to ensure safety and additionally, satisfactory EMI suppression (see below).

HAZARDOUS VOLTAGES EXIST WITHIN A POWER SUPPLY ENCLOSURE AND ANY REPAIRS MUST BE CARRIED OUT BY A QUALIFIED SERVICEPERSON.

Electrical Strength Tests

Components within the power supply responsible for providing the safety barrier between input and output are constructed to provide electrical isolation as required by the relevant standard. However EMI filtering components could be damaged as result of excessively long high voltage tests between input, output and ground. Please contact our technicians for advice regarding electric strength tests.

Earth Leakage

The EMI suppression circuits causes earth leakage currents which may be to the maximum allowable of 3.5mA.

Ventilation

High operating temperature is a major cause of power supply failures, for example it has been well documented that a 10°C rise in the operating temperature of a component will halve its expected life. Therefore always ensure that there is adequate ventilation for the equipment. Batteries and cooling fans also suffer shortened lifetimes if subjected to high ambient temperatures - both should be included in a routine maintenance schedule to check for signs of reduced efficiency.

Water / Dust

Every effort must be made in the installation to minimise the risk of ingress of water or dust. Water will almost always cause instant failure. The effects of dust are slower in causing failure of electronic equipment but all electrical equipment should be cleaned free of any dust accumulation at regular intervals. This is particularly important where internal fans are fitted.

Electromagnetic Interference (EMI)

Switching power supplies and converters inherently generate electrical noise. All wiring should be as short as practicable and segregated from all equipment wiring which is sensitive to EMI. Residual noise can be reduced by looping DC wiring through ferrite cable sleeves. These are most effective as close to the power supply as possible and as many turns of the wire taken through the core (+ and - in the same direction) as the core will accommodate.

Fuse ratings

Check that the wiring and fuses or MCBs match the rating of the PSU or converter. Adequate fuse protection of battery circuits is very important owing to the large potential currents available from batteries. Our ***No-Break DC*** series has an internal ECB for protection of the battery circuit but for all other charging situations should have an external fuse or circuit breaker fitted in the battery circuit.

Connection polarity

It is critical to check the polarity carefully when connecting batteries and equipment to DC power supplies and chargers. Boost chargers (and some float chargers) made by Innovative Energies have reverse polarity protection, which can be by an electronic switch (non-destructive) or an internal fuse which needs to be replaced if a battery is connected in reverse.

Glossary of terms used in our user manuals

PSU = power supply unit

BCT = battery condition test

ECB = electronic circuit breaker

ELVD = electronic low voltage disconnect

RPP = reverse polarity protection

EMI = electromagnetic interference

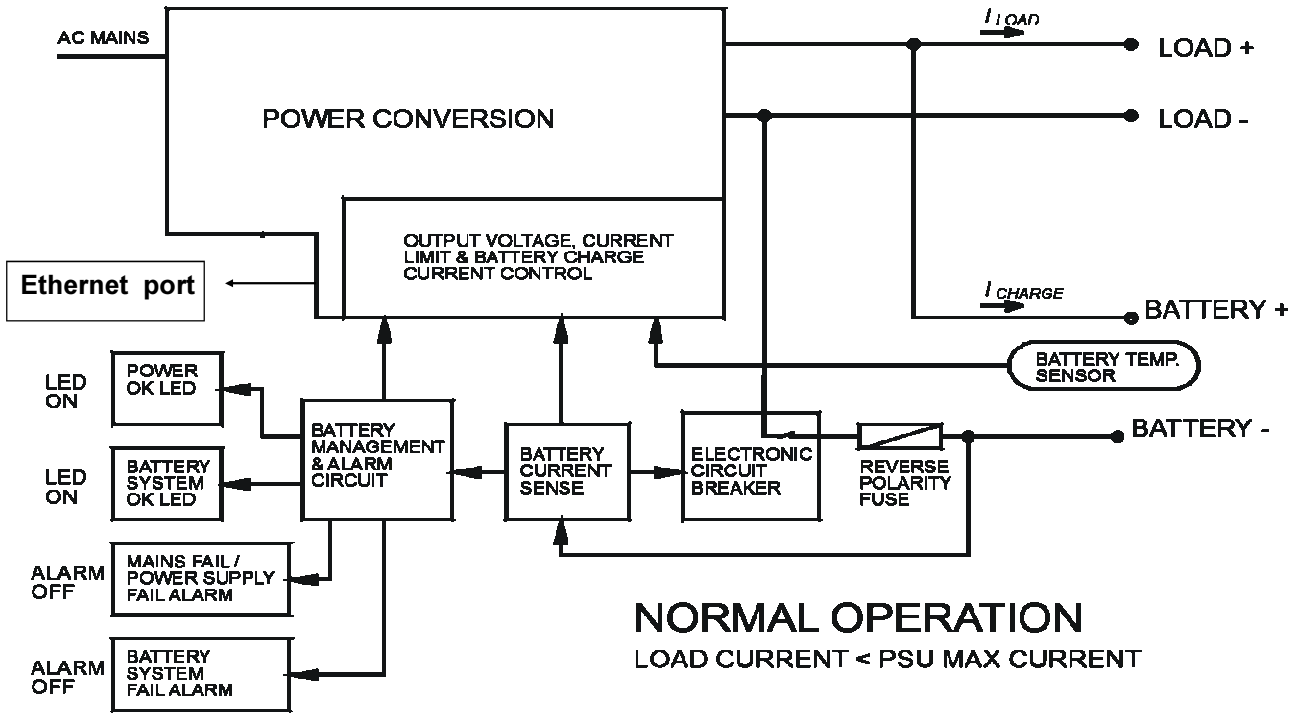
SNMP = Simple Network Management Protocol

LAN = local area network

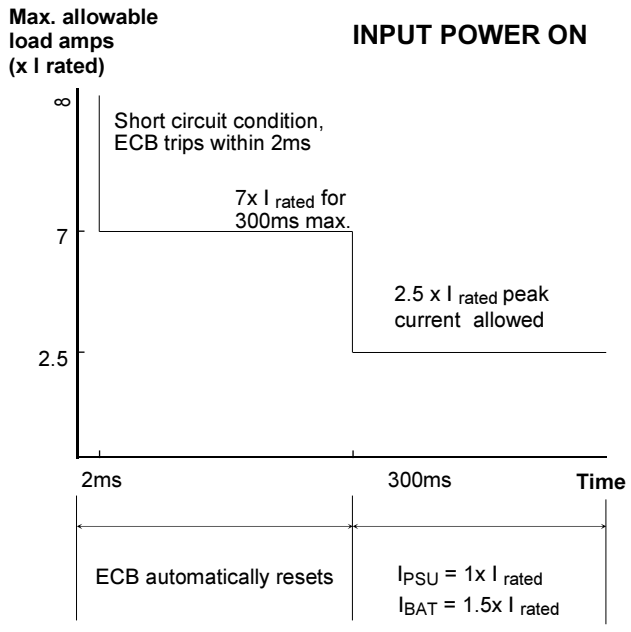
INTRODUCTION

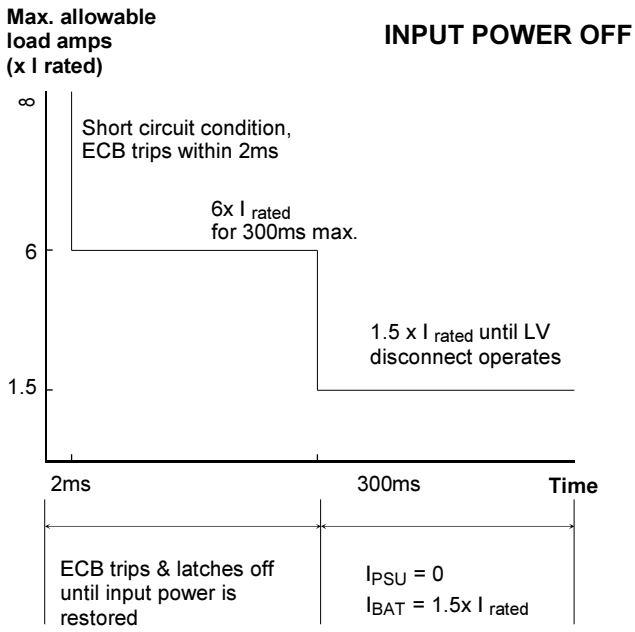
The ***No-Break*** ™***DC*** power supply is designed to provide DC power to lead acid batteries for critical back up applications. In addition to the normal features of the standard **SR750C..** model, the **SR750*i*….-LAN+** has an ethernet communication interface using SNMP protocol to enable user monitoring of the power supply and battery parameters and control of the battery condition test function.

No-Break™ SYSTEM BLOCK DIAGRAM



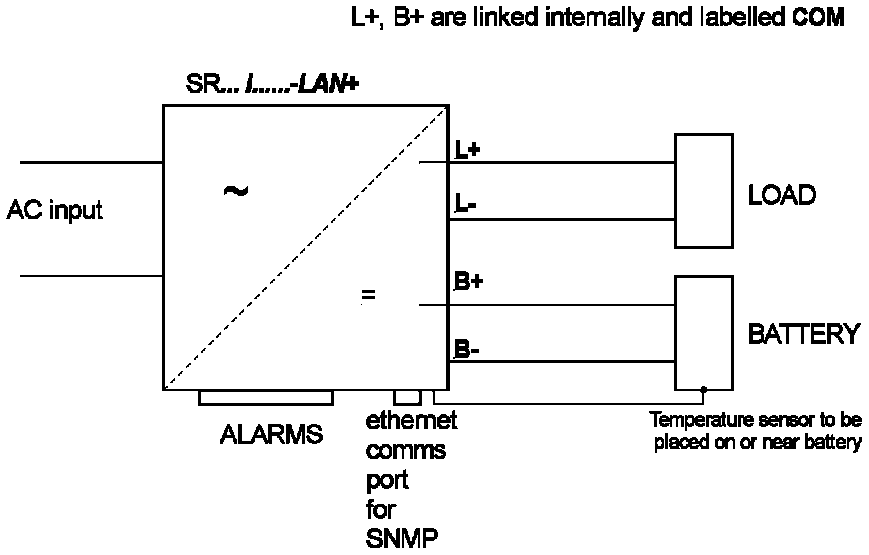
OPERATION OF ELECTRONIC CIRCUIT BREAKER (ECB) FOR PROTECTION OF BATTERY CIRCUIT





The ECB will operate on overcurrent as above & is also activated for the low voltage disconnect function on mains fail (no input power). It will reset when input power is restored, or can be manually reset by briefly shorting the **BAT-** and **LOAD-** terminals together when there is no input power.

CONNECTION DIAGRAM



CONNECTION & INITIAL TESTING

1 Check input and output voltages of system, ensure that they match the equipment. All loads should be isolated.
2 Check polarity of all wiring. Place temperature sensor probe near or on batteries.
3 Plug in input power. "**POWER OK"** LED will light up. DC output voltage should appear at both load and battery outputs.
4 Turn off input power.
5 Connect battery.
6 Check that ECB (internal electronic circuit breaker) closes by shorting together the **BATTERY –ve** and **LOAD –ve** terminals briefly. Both LEDs will light up. If this does not happen, there is a fault in the wiring or the internal battery protection fuse is ruptured (see Note 2 below). The battery voltage will then appear at the load terminals and the **"BAT LOW"** alarm relay energises. The **"POWER OK"** LED stays on for about 30 seconds.
7 Connect load wiring to **LOAD+** and **LOAD-** terminals.
8 The system is now ready for operation.
9 Please refer to separate user manual for setting up the SNMP web interface.

NOTES

1 Maximum current available
with input power present: 2.5 x rated PSU current
with no input power: 1.5 x rated PSU current

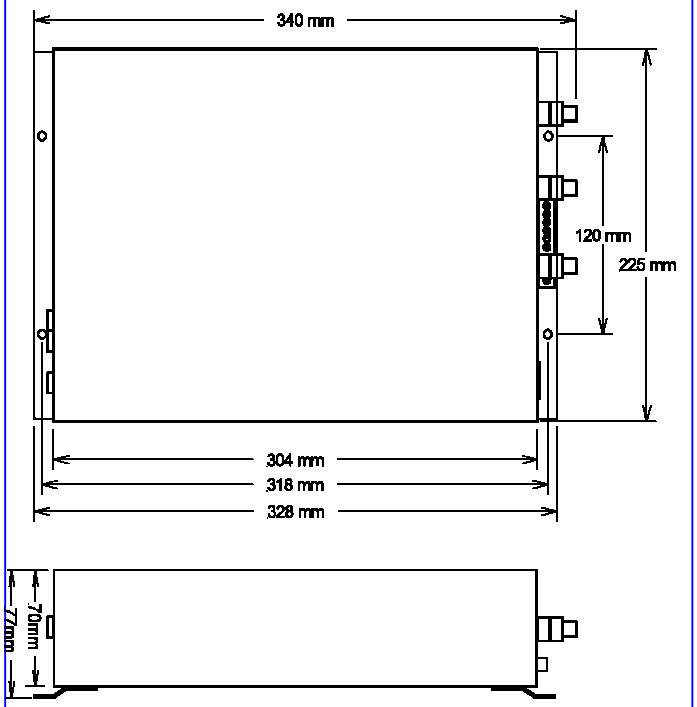
2 Reverse polarity protection
If the battery is connected in reverse, the internal battery protection fuse may be ruptured and the unit should be returned to the manufacturer for repair. If the fuse is good, the voltage measured as at step 3 above should be exactly the same on both the load and battery outputs.

3 Battery Condition Test (BCT)
BCT function is disabled on start up and is controlled via the SNMP interface.

4 BCT fail reset
If the system fails a BCT the **BAT LOW** alarm latches (de-energized state) until

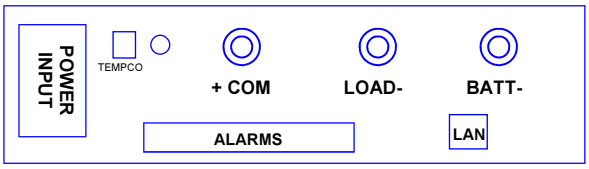
either: both the mains power input and the battery are disconnected briefly
or: the system passes the next BCT.

DIMENSIONS



CONNECTION LAYOUT

Stud terminals



NOTE: LOAD+ / BATT+ terminals are linked internally and are connected to the **+COM** terminal

FRONT PANEL LEDS (WITH BUILT IN SWITCHES)

For full list of LED flash codes please refer to page 7.

BATTERY SYSTEM OK: ***LED on:*** Battery present and above V batl.

POWER OK: ***LED on:*** Input power present

STANDBY: ***LED on:*** Charger in standby mode (no output from charger)

Warning: Do not put unit into standby mode during normal operation as **"BATLOW"** alarm and low voltage disconnect are both disabled.

ALARM RELAYS

AUX: Relay is energized when the battery condition test is in progress

MAINS FAIL: Alarm indicates loss of input power after 30 sec delay.

BAT LOW: Relay is de-energized when either:
1. battery voltage = 1.8V/cell (for 2V cells) - operates only when no input power present ***or***
2. battery missing or fault in battery circuit wiring (alarm does not activate for up to battery detection interval time).

SPECIFICATIONS (at 20 degrees C)						
Parameter	**Nominal Voltage**					**Default Value**
	12V	**24V**	**30V**	**36V**	**48V**	
*[1] **V out** = Output voltage	13.8	27.6	34.5	41.4	55.2	2.3V/cell
V pres = Voltage threshold for battery detection & battery condition test (BCT). If voltage drops to this level during BCT then the test is aborted and **BATT SYS OK** relay de-energises	12.2	24.4	30.5	36.6	48.8	2.03V/cell
V shutd = Output voltage of PSU during battery detection & BCT	11.5	23	28.8	34.5	46	1.92V/cell
V batl = Battery low alarm voltage during mains fail. (**BATT SYS OK** alarm relay de-energizes)	11	22	27.6	33	44	1.84V/cell
V disco = Battery disconnect voltage during mains fail	10	20	25	30	40	1.66V/cell
Bccl = Maximum charge current as % of rated PSU rated current						*2
Comms = communications mode of PSU: F = continuous data stream of status M = responds only to request made by a controller						M
BatDetect = Battery detection interval time, active only when no battery charge current is detected (the unit may not detect a missing battery for up to this time)						60 min
BCT = length of battery condition test						20 min
Ret = retest option: N = after a failed BCT further scheduled BCTs are inhibited Y = after a failed BCT further scheduled BCTs will be allowed						Y
CC = Length of charge cycle in minutes/hours/days. ie. time between battery condition tests						40m/23h/ 027d
MfiBCT = time before mains fail check during BCT. A mains fail during a BCT will stop the BCT. If set longer than **BCT** time no mains fail check will occur.						30 min

NOTES:

***1** Output voltage is set by an internal potentiometer.

***2** Refer to 'PSU Configuration' page on website

LED INDICATION CODES					
Battery System OK LED	**Power OK LED**	**Stand-by LED**	**Battery System OK Alarm**	**Power OK Alarm**	**Condition**
		○	Normal	Normal	System Normal: Input power on, battery circuit is OK
		○	Normal	Normal	Battery detection test in progress
○		○	Alarm	Normal	Input power on, battery system fault: 1. Internal battery fuse has opened ***or*** 2. Battery circuit wiring open circuit, battery missing, ECB has tripped
	○	○	Normal	Alarm	Input power off, battery system is OK (battery volts > Vbatl)
	○	○	Alarm	Alarm	Input power off and battery has discharged to ≤ V batl
○	○	○	Alarm	Alarm	Input power off, ELVD has activated and disconnected battery from load.
		○	Normal	Normal	BCT is in progress: LEDs flash slowly
		○	Alarm	Normal	Input power on, battery condition unserviceable- battery voltage < Vpres during a BCT
			Normal	Normal	PSU in standby, input power on, battery system OK
○	○		Alarm	Alarm	PSU in standby, input power present, battery missing.
			Alarm	Normal	PSU in standby and system has failed previous BCT

LEGEND : =on =fast flash =slow flash ○ =off

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SR500i

With Ethernet (SNMP) communication port

Optional internal V/I meter shown

- **Remote monitoring of DC system via internet connection**
- **BCT controlled via web page or SNMP MIB browser**
- **Includes all the features of our standard *No-Break DC* UPS systems**
- **Separate outputs for load and battery**
- **Battery detection - regular battery presence and battery circuit integrity checks**
- **Deep discharge protection for battery**
- **ECB for overload protection of battery circuit**
- **Fused reverse battery polarity protection**
- **Automatic temperature compensated output volts**
- ***No-Break* switching between PSU & battery**
- **LED flash codes for precise state indication**
- **Two alarm relay outputs standard + BCT relay**

♦ 24 Month Warranty

SPECIFICATIONS

All specifications are typical at nominal input, full load and at 20°C unless otherwise stated.

ELECTRICAL

AC Input	230V AC: 180V - 264V (standard) 110V AC: 88V - 132V (on request)
Frequency	45- 65 Hz
Fusing / Protection	Input fuse Output fuse & ECB for battery
Isolation	1KV DC input - output / earth
Efficiency	≥ 85%
Inrush current	Soft start circuit
Output Power	500W
Output Voltages	13.8, 27.6, 34.5, 41.4, 55.2V
Voltage adj. range	85 - 105% of Vout
Temp. Compensation	Temperature sensor on 1.7m lead with adhesive pad: -4mV / °C / cell ±10%
Current Limits	**PSU:** 100% rated current **Battery:** 25-100% PSU current
Line Regulation	<0.2% over AC input range
Load Regulation	<0.4% open circuit to 100% load
Noise	<1%
Drift	0.03% / °C
Hold-up time	15 - 20 ms (nom. - max. Vin) without battery
Thermal Protection	Yes, self resetting
OVP	Over-voltage protection on output at ~ 130% of nominal output voltage
Battery Condition Test (BCT)	Default setting: 20mins/28 days. Control of BCT is implemented using the SNMP software. Please do not hesitate to ask our sales staff for assistance with this feature.

No-Break™ FUNCTIONS AND ALARMS*

Battery Charge Limit	See Model Table for default settings - may be increased to PSU rated current
Reverse Polarity	Battery reverse connection will open internal fuse (and produce alarm)
Battery Monitoring	Detects for presence of battery on start up, then every 60 minutes when charge current < 200mA
Battery Protection	Electronic Circuit Breaker (ECB) operates under the following conditions:
- low battery volts	• battery voltage drops to 1.67V/cell - auto reset
- overload	• < 300ms for load > 6 x rated PSU current, allows ~1.5x rated PSU current from battery without acting,
- short circuit	• < 2ms, backed up by fuse
Indication LEDs	**Green:** Battery System OK, Power OK **Red:** Standby
Alarms	• Power OK (Mains/PSU fail, standby mode) • Battery System OK - alarms when battery voltage low (on mains fail) , battery missing, battery circuit wiring faulty, BCT fail (if enabled)
Alarm Relay contacts	C - NO - NC full changeover rated 1A /50V DC, 32VAC
Standby Mode	Turns off DC output of PSU & allows load to run off battery

ENVIRONMENTAL

Operating temperature	0 - 50 °C ambient at full load De-rate linearly >50 °C to no load @ 70 °C
Storage temperature	-10 to 85 °C ambient
Humidity	0 - 95% relative humidity non-condensing
Cooling	Fan cooled

STANDARDS

EMI	to CISPR 22 / EN55022 class A
Safety	to IEC950 / EN60950 / AS/NZS3260

500 Watt
No-Break™ DC charger for lead acid batteries

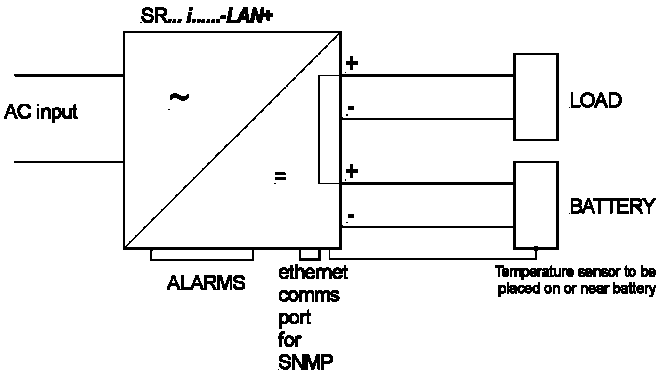
SR500i

STANDARD MODEL TABLE

MODELS	DC Output				
	Output (V)	PSU Rated (A)	Charge Limit (A) *1	Recomm. Load (A)*2	Peak load on input fail (A)
SR500*i* 12	13.8	36	36	27	54
SR500*i* 24	27.6	18	18	12	27
SR500*i* 30	34.5	14.5	14.5	10	21.5
SR500*i* 36	41.4	12	12	7	18
SR500*i* 48	55.2	9	9	5	13.5

*1 charge current limit may be varied at time of order
*2 to allow for adequate charging current

SCHEMATIC BLOCK DIAGRAM



PHYSICAL

AC Input connector	IEC320 inlet socket
DC Output Connections	M8 brass stud or plug-in/ screw terminal block (20A/ terminal)
Alarm Connections	Plug in/ screw terminal block
Enclosure	Powder coated steel
Weight	4.3kg
Dimensions	225W x 304D x 70H mm (excluding mounting feet and terminals)

OPTIONS

19"Rack Mount	2U sub rack option: add **SR-RM2U** Optional V/I meter for subrack**: SR-METER**
Wall Mount Enclosure	PSU may be fitted into enclosure with MCBs and terminals. **Code: SEC-SR**
Parallel redundancy	Use external output diode, eg **+P50.** Please refer to separate application notes.
Internal Digital V/I Meter	Add code **+INT-METER**

ACCESSORIES SUPPLIED

Mounting feet together with screws
AC power cord 1.5m with IEC320 socket & AUS/NZ plug
Mating screw terminal plug for DC connector for 'X' version
Mating screw terminal plug for alarm outputs
Crimp lugs for 'S' version

MODEL IDENTIFICATION CODES

SR500 *i* 12 T F S L-LAN+

Communication port:	**LAN+** = Ethernet (SNMP)
Input voltage and front panel standby switch:	230V AC + switch = **L** 230V AC no switch = blank 110V AC + switch = **U** 110V AC no switch = **G** 110V DC + switch = **H** 110V DC no switch = **J**
Output DC Connector type:	Stud = **S** Phoenix combicon (plug in /screw terminal block) = **X**
Cooling	Fan cooled = **F**
Temperature Compensation	Yes = **T** No = blank
DC output: Nominal voltage	12, 24, 30, 36, 48V
Function	***i*** *= No-Break™ DC with communication port*
Power	500W

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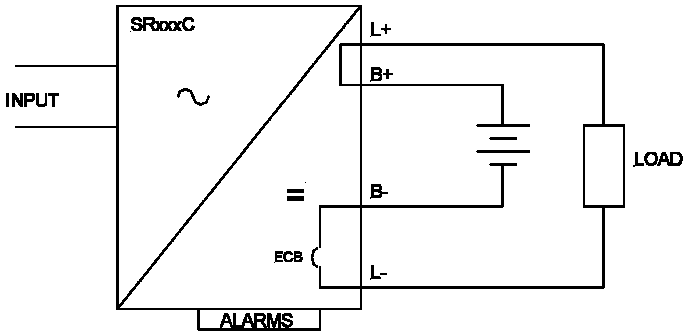
#1 1 x *No-Break™DC* charger and 1 x battery bank

This is the basic connection which is most commonly used, and provides adequate protection for the majority of systems requiring DC back up in the event of a mains power failure.

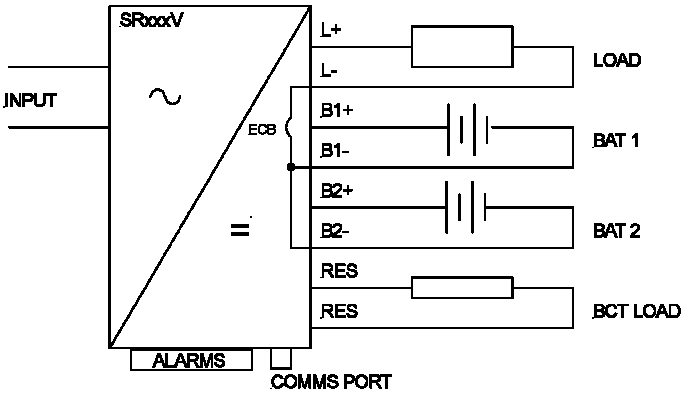


Single battery DC backup system

Alarms Available	
Power OK	YES
Battery Missing	YES
Battery Low	YES
Battery Condition Test Fail	YES

#2 1 x *No-Break™DC charger and 2 x battery banks*

The **SR250**xxxV ***No-Break™DC*** UPS is designed to provide superior battery backup availability without having to use two power supplies. Dual battery banks and automatic battery condition testing reduce the risk of battery failure for critical applications.

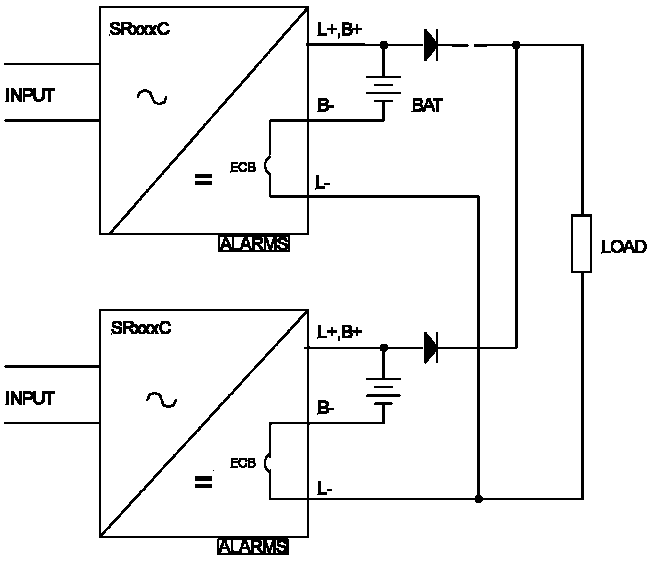


N+1 redundancy for batteries

Alarms Available	
Power OK	YES
Battery Missing (B1&B2)	YES
Battery Low (B1&B2)	YES
Battery Condition Test Fail (B1 & B2)	YES

#3 2 x *No-Break™DC* chargers and 2 x battery banks

2 x No-Break™DC chargers connected in parallel with separate battery banks & output diodes. This solution provides an extremely high level of redundancy for very critical applications, with redundancy of the battery in addition to the power supply. The diodes isolate the units from one another in the event of a short circuit appearing at the other output and aid current sharing.



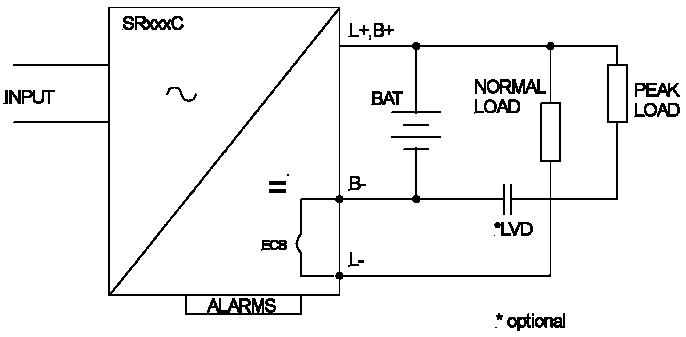
N+1 redundancy for charger and batteries

*[1] interlock circuit required for automated BCT

Alarms Available	
Power OK	YES
Battery Missing	YES
Battery Low	YES
Battery Condition Test Fail*[1]	YES

#4 *No-Break™DC* Connection for high peak loads

This is a basic connection which is used when there is a connected load with a peak current greater than 1.5 times the rated current of the charger. Standing loads are connected normally and an optional external low voltage disconnect may be used for the peak load.

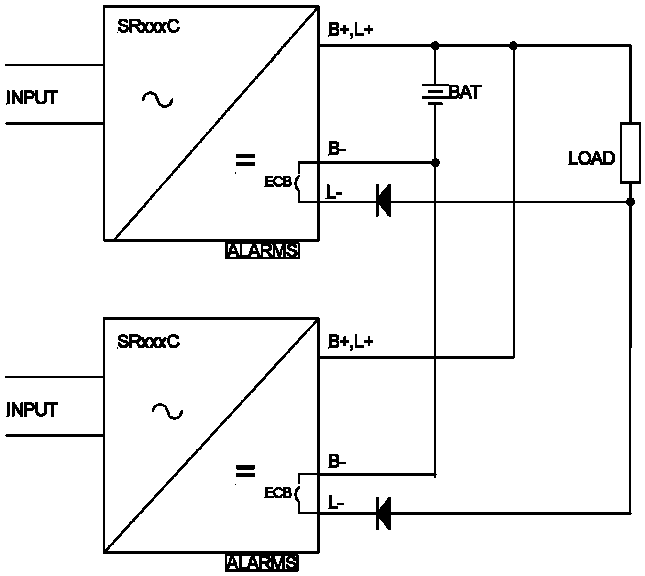


Single battery DC backup system for peak loads

Alarms Available	
Power OK	YES
Battery Missing	YES
Battery Low	YES
Battery Condition Test Fail	YES

#5 N+1 for *No-Break™DC* charger and single battery bank

This connection provides for redundancy of the charger and retains most of the No-Break functions.

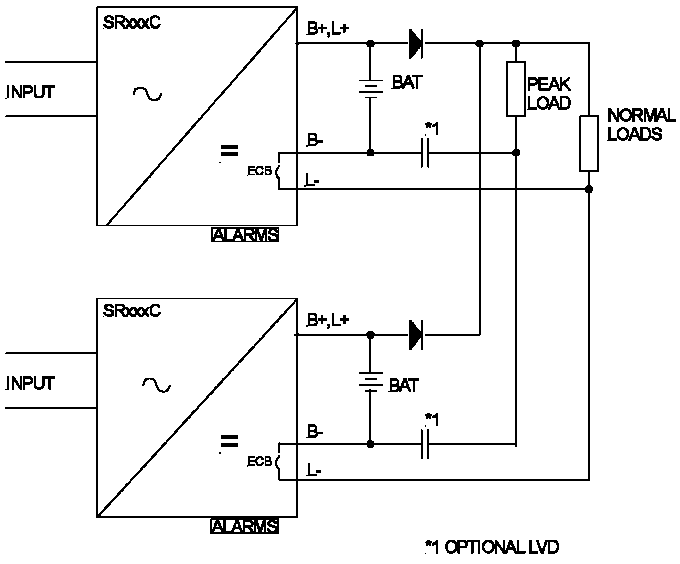


*1 interlock circuit required for automated BCT

Alarms available	
Power OK	YES
Battery missing	NO
Battery low	YES
Battery condition test fail*1	YES

#6 N+1 for *No-Break™DC* charger and N+1 for battery bank (use this connection for high peak loads)

All *No-Break* alarms are available and the low voltage disconnect for the peak load is optionally implemented with an external relay.

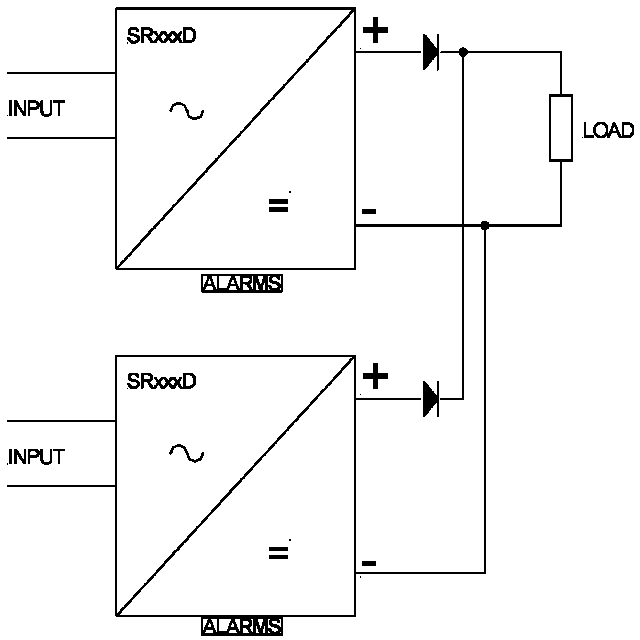


*2 interlock circuit required for automated BCT

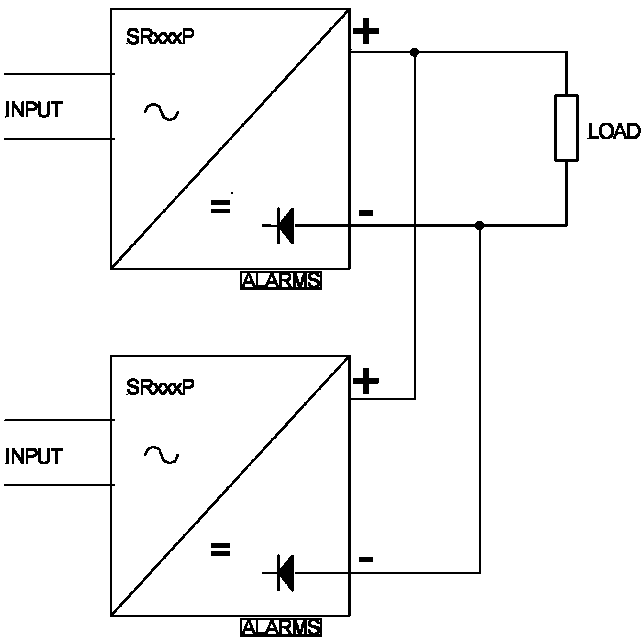
Alarms available	
Power OK	YES
Battery missing	YES
Battery low	YES
Battery condition test fail *2	YES

Standard N+1 redundant DC connections

#7 Standard AC/DC power supplies with alarms and external diodes



#8 Standard AC/DC power supplies with internally fitted diodes (applies only to SR100P and SR250P models with outputs >12VDC)



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TERMS OF WARRANTY

Innovative Energies Ltd warrants its power supplies for 24 months (two years) from date of shipment against material and workmanship defects.

Innovative Energies' liability under this warranty is limited to the replacement or repair of the defective product as long as the product has not been damaged through misapplication, negligence, or unauthorized modification or repair.

Thank you for purchasing from Innovative Energies.

We trust your power supply will exceed your expectations and perform for years to follow.

Sincerely,
The Innovative Energies team.

Innovative Energies Limited

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